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NOTE ON THE "PELVIC WING" IN POULTRY¹

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KANSAS AGRICULTURAL EXPERIMENT STATION

QUITE recently Beebe (1915) proposed a four-wing theory of the origin of flight in birds in the stages succeeding the arboreal phase of their evolution. Osborn (1918) raises this theory to the position of an alternate with the older two-wing theory developed from studies on the Archæopteryx (see Heilmann, 1913). Beebe bases his theory on observations of nestlings of the white-winged dove (*Melopelia asiatica*) and the domestic pigeon (*Columba livia* Bonn.), an embryo of the jacana (*Jacana jacana*), a living specimen of the great horned owl (*Bubo virginianus*) and studies of photographs of the Berlin specimen of the Archæopteryx.

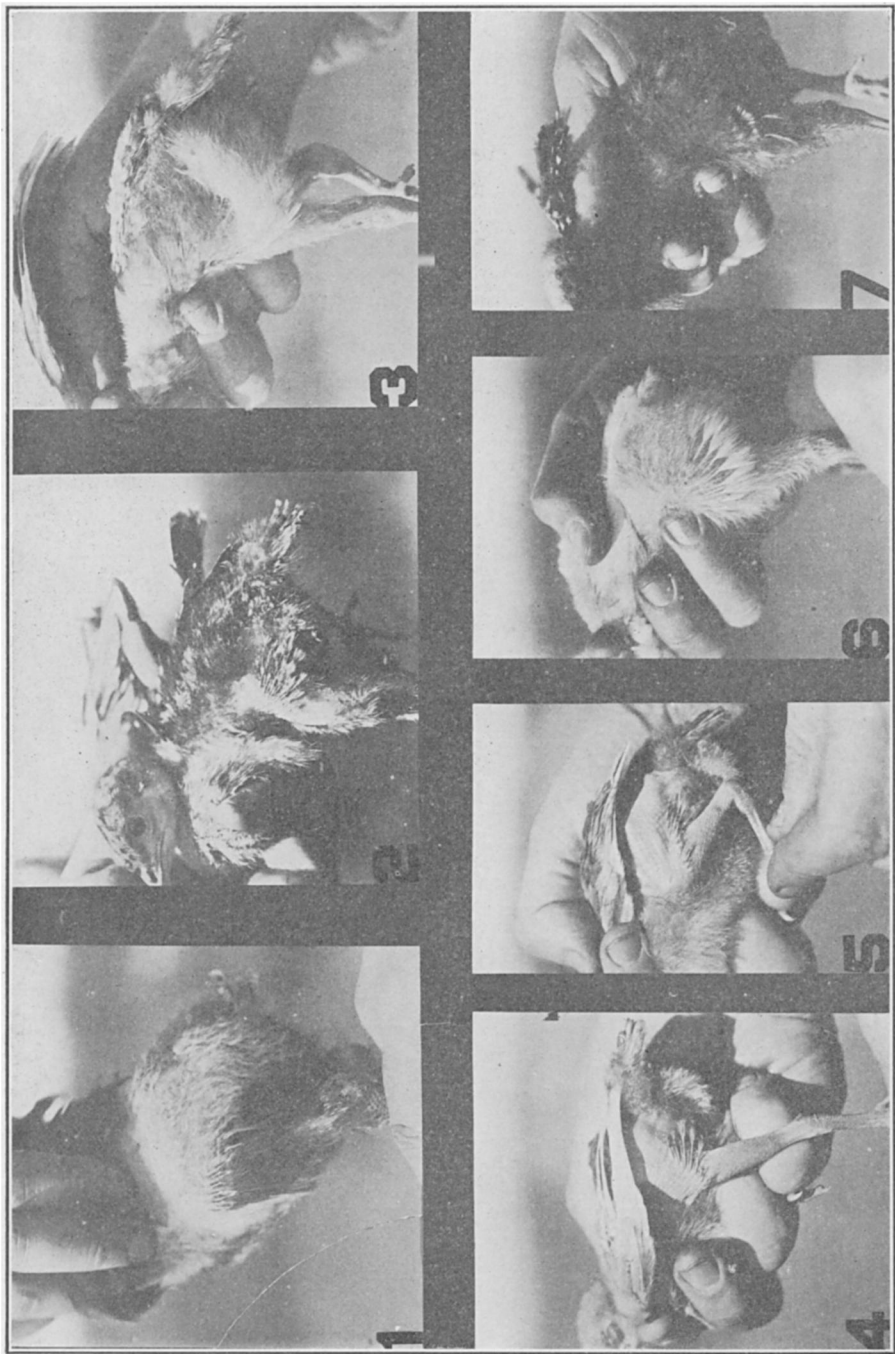
The purpose of this note is to report the presence of the structure described by Beebe, in certain domestic birds. In reporting his discovery of a "pelvic wing" in nestling birds Beebe (p. 42) makes the following statement:

Recently while examining the fresh body of a four-days-old white-winged dove in the New York Zoological Park, I observed on its almost naked body a remarkable development of sprouting quills across the upper part of the hind-leg, and extending toward the tail across the patagium just behind the femur. A second glance showed that this was no irregular or abnormally precocious development on the part of the femoral pterylum, but a line of primary like sheaths, many of which had a very definitely placed covert.

He then proceeds to a rather detailed description of the structure which he called a "pelvic wing."

What appears to be the same structure, judging from Béebe's description and from the figures accompanying his paper, may be readily observed on most chicks of the

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American and Mediterranean breeds at three weeks of age or younger and on English and Asiatic chicks a week or two later.

In the routine of describing three-weeks old chicks in connection with certain genetic studies, the writer has noted and recorded the presence of this structure on several hundred individuals. It has seldom been lacking on chicks of the Mediterranean breeds and crosses, and is usually found on chicks of the American breeds, and frequently on those of English and Asiatic breeds of this age. Its non-appearance in chicks of the lighter breeds, by the time they are three weeks old, is usually associated with low vitality and general slowness of feathering. The heavier breeds are naturally slower in passing from the down to the feather stage and its failure to develop in the first three weeks is more frequent.

While not all of the individuals which failed to show the so-called pelvic wing in three weeks were reexamined, many of them were and in every instance the structure was found at some stage of development. The parents of the chicks observed were not only of several distinct breeds and classes but were frequently from widely separated sections of the country. The number of observations made and the various sources of the breeding stock seem to warrant the belief that the "pelvic wing" in the young domestic fowl is of fairly constant occurrence.

It is interesting to note in this connection that the

EXPLANATION OF PLATE I

FIG. 1. Pelvic wing of Rhode Island Red chick hatched February 4, 1919, photographed March 27, 1919. Age fifty-one days.

FIG. 2. Pelvic wing of bronze poult hatched June 7, 1919, photographed July 11, 1919. Age thirty-four days. Some down feathers plucked to show structure more clearly.

FIG. 3. Pelvic wing of Blue Andalusian chick hatched February 25, 1919, photographed March 27, 1919. Age thirty days.

FIG. 4. Pelvic wing of Blue Andalusian chick hatched March 18, 1919, photographed March 31, 1919. Age thirteen days. Down plucked to show structure more clearly. Leg extended.

FIG. 5. The same individual shown in 4, with leg flexed.

FIG. 6. Pelvic wing of White Plymouth Rock chick hatched March 4, 1919, photographed March 27, 1919. Age twenty-three days.

FIG. 7. Pelvic wing of Barred Plymouth Rock chick hatched March 4, 1919, photographed March 27, 1919. Age twenty-three days.

“pelvic wing” is clearly illustrated in two photographic figures of four weeks old White Leghorn chicks in Rice, Nixon and Roger’s (1908, pp. 25–26, Figs. 6 and 7) paper on “The Molting of Fowls.” The structure is referred to by these writers as “the thigh tract.”

In chickens the “pelvic wing” occurs along the postero-ventral border of the femoral or lumbar tract, as described by Nitzsch (1867, Plate VII, Fig. 6) for *Gallus bankiva* and appears to be a part of it. In its development it is synchronous with, or slightly preceded by, the feathers of the humeral tract and has so much in common with the latter as to suggest that the two tracts may be homologous structures of the hind and fore-limbs, respectively. The “pelvic wing” extends across the upper part of the hind limb and a more or less well-marked patagium just behind the femur. The humeral tract extends across the upper part of the fore limb and the patagium behind the humerus.

The appearance of the “pelvic wing” of chicks of different breeds is shown in Plate I, Figs. 1, 3, 4, 5, 6, and 7.

The structure in the Bronze turkey (Fig. 2) is essentially the same as in chickens. This breed is the largest and commonest variety of domestic turkeys and most nearly resembles their native wild progenitors.

In the waterfowl the structure has not been found. This was perhaps to be expected from the figures of Nitzsch (1867, Plate X, Figs. 5, 6, and 7). The birds observed were domesticated Mallard ducks and White Embden geese. In neither could any feathers be discovered which were set off from the others of the femoral tract, either in size, or precocity of development. There is however in both species a group of feathers whose development is simultaneous with that of the feathers of the humeral tract. These are situated on a branch of the inferior tract which extends beyond the breast along the sides of the trunk almost to the knee. The feathers of both these tracts precede the remiges in development.

Nitzsch (1867, p. 146) makes note of the fact that “this

short outer branch (of the inferior tract), and the broad, obtuse axillary tract, constitute the strongest portion of the entire plumage of the trunk." The position of these feathers is such as to suggest a pelvic wing to a casual observer. He further (p. 177) calls attention to the unusual development of this branch in *Crypturus*, where it "passes through the lateral space of the trunk and unites with the extremity of the lumbar tract of the same side."

The conditions found in *Crypturus* (see Nitzsch's Plate VII, Figs. 11 and 12), ducks, geese and chickens might suggest the possibility that the "pelvic wing" in the chicken, and the branch of the inferior tract in the duck and goose are both vestiges of what was once a continuous row of rather large feathers extending from below the shoulder along the edge of the breast and out over the thigh. Such a suggestion, however, presents difficulties if the homology of the pelvic wing and the humeral tract is seriously considered. Judging from Nitzsch's figures of *Crypturus* (Plate VII, Figs. 11 and 12), there is probably no connection between this branch and the humeral tract.

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